

structure is that, especially when the longitudinal bias layers are hard magnetic layers, the influence of the stray magnetic field from the hard magnetic layer could be trapped in the vicinity around the track edges in which the electrodes and the spin valve film are laminated, whereby the sensitivity profile of the reproduction track width (this is defined by the electrode spacing) in the track width direction could be sharper and its accuracy could be augmented. In particular, for high-density recording for which the reproduction track width shall be of a sub-micron level, the merit of the structure is more remarkable than in the prior art technique. Naturally, the lead-overlaid structure could apply to the embodiments of Fig. 21 and Fig. 27.

Fifth Embodiment:

Fig. 30 shows still another embodiment of the invention. Like in the second embodiment shown in Fig. 21, a lower shield and a lower cap (not shown) are formed on a substrate (not shown), a spin valve film 13 is formed thereover, and an upper cap, an upper shield and a recording part (all not shown) are formed still thereover. At the both track edges of the spin valve film 13, formed are a pair of longitudinal bias layers 15 and a pair of electrodes 16. One example of the longitudinal bias layers is illustrated, which is a laminate film comprising a underlayer 153, a ferromagnetic film 151 and an antiferromagnetic film 152. Naturally, the longitudinal bias

layers may be of a hard magnetic film of CoPt or the like.

The electrodes 16 are formed of a material at least containing a low-resistance metal, such as Ta/Au/Ta or the like. In the illustrated case, the electrode spacing LD is narrower than the longitudinal bias layer spacing HMD, and the spin valve film 13 and the electrodes 16 have a region in which they are face-to-face contacted, in the vicinity of the both track edges. The longitudinal bias layers and the electrodes are generally formed in a lift-off method, but they may be also formed through ion milling, reactive ion etching or the like. Though complicated, a dry process is suitable for forming precision electrodes.

In the region of the spin valve film 13 just below the electrodes 16 where the longitudinal bias layers 15 do not exist, when the resistance of the electrodes is much smaller than that of the spin valve film, for example, when the former is at most 1/10 of the latter, then the reproduction sensitivity is greatly lowered in the region except the electrode spacing region, for example, in the region of the spin valve film just below the electrodes, if the magnetization of the free layer 146 in the spin valve film is settled nearly in the track width direction when the ambient magnetic field is zero. In that condition, therefore, the reproduction track width could be defined by the electrode spacing LD, whereby a steep reproduction sensitivity profile could be realized at the track

edges.

In addition, in the illustrated constitution, since the face-to-face contact region for the spin valve film 13 and the electrodes 16 could be much larger than in an ordinary abutted junction type constitution, the contact resistance between the electrodes and the spin valve film could be well minimized. With this, therefore, low-resistance spin valve devices could be realized, and even low-noise, ESD-resistant magnetoresistance effect heads could be realized.

For further narrowing the reproduction track width for the purpose of increasing the recording density in coming devices, the electrode spacing LD must be narrowed. On the other hand, however, if the electrode spacing is too narrow, it will be difficult to much more reduce the width or the height of the device. Therefore, it is desirable that HD is larger than LD for increasing the yield of heads. Concretely, regarding the height which will be a dimension-determinant factor in machine working for the purpose of increasing the yield of heads in mass production, the height must be at least around $0.5\text{ }\mu\text{m}$ or larger. When the reproduction track width is narrowed to $0.5\text{ }\mu\text{m}$ or smaller, it is desirable that HD is settled larger than LD. However, this will bring about the following problems.

The first is that, since the resistance of the spin valve film region for reproduction is reduced, the reproduction